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PATENT



SPECIFICATION

*Application Date, Apr. 29, 1918. No. 7152/18.**Complete Left, Aug. 30, 1918.**Complete Accepted, Apr. 29, 1919.*

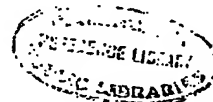
## PROVISIONAL SPECIFICATION.

**Improvements in or relating to Automatic Air Inlet Valves for  
Low-pressure Steam Heating Apparatus, and the like.**

We, FRANK TAYLOR and HIRAM GRIMSHAW TAYLOR, both of Albert Mill, Milltown Street, Radcliffe, Lancashire, Cotton Manufacturers, do hereby declare the nature of this invention to be as follows:—

- In the known type of heat controlled air inlet and outlet valve used with low pressure steam heating apparatus, the valve opens with a fall of temperature and closes with a rise of temperature, its use being to admit air into the pipe when the steam fails and destroy any vacuum formed within the pipes, and on the steam again flowing through the pipes, to allow of the air being driven out before closing.
- 5 The fault of this type of valve, especially with steam pipes of considerable length, is that it does not open quick enough and allows of a substantial vacuum being formed before admitting the air, and under such circumstances the water in the boiler flows into the steam pipes and tends to empty the boiler.
- 10 This invention has for its object a form of mechanical (non-thermostatic) air valve which will act with great promptitude and before a vacuum can be formed in the pipes, thereby preventing the water in the boiler entering the pipes. A further object is so to proportion the improved air valve that it will allow of any air in the pipes escaping before reclosing. A further, or alternative, object of the invention is to combine the known heat-controlled vent cock, with the
- 15 said mechanical air valve, whereby one will open quickly to admit air into the pipes and prevent a vacuum being formed, whilst the other will close slowly to allow the air in the pipes to be driven out before closing.
- According to the invention, the improved mechanical air valve consists of an ordinary mushroom valve, adapted to be fitted in say the upper part of a steam
- 20 pipe, and to fall from its seating by gravity when unsupported by steam in the pipe, and to close on to such seating under the pressure of the steam.
- The valve stem is preferably hollow and bored laterally near the valve to allow of the quick ingress of air into the pipe. Further, the stem is also preferably formed rectangular or triangular in cross-section, so as to leave ample
- 25 room for the passage of the air into the pipe.
- To limit the fall of the valve, its stem will be provided with a cross-pin, long enough to extend across the top edges of the valve casing, which will usually be in the form of a T coupling, the valve being in the vertical part of the coupling.
- 30 With the valve stem formed hollow it may be of large area without much weight, and in this connection it is adapted to open quickly and close steadily,

[Price 6d.]



To delay the closing and thus allow air to escape, the valve may be provided with, or formed as a dash-pot, the valve falling quickly but rising slowly.

The valve will preferably be made of brass or aluminium. There will be, at least, one of the improved air valves for each steam circulating pipe, arranged at the return end of the pipe and near the boiler. There will also be one of the improved air valves for preventing a vacuum in the steam drum or boiler.

When the ordinary heat-controlled vent cock is used, it will either be fitted into the steam pipe alongside the said mechanical air valve, or it may form an integral part thereof. In such connection the mechanical valve may form the casing of the heat-controlled valve.

Instead of being secured to the mechanical air valve, the heat-controlled vent cock may be fitted to a bush or plug common to both, so as to be capable of being sold and fitted as one appliance.

Whilst chiefly for use with low pressure steam heating apparatus, the improved valve, or combined valves, may be applied to other apparatus working under similar conditions.

Dated this 23rd day of April, 1918.

For the Applicants,

JOHN G. WILSON & Co.,  
Chartered Patent Agents,  
55, Market Street, Manchester.

#### COMPLETE SPECIFICATION.

#### Improvements in or relating to Automatic Air Inlet Valves for Low-pressure Steam Heating Apparatus, and the like.

We, FRANK TAYLOR and HIRAM GRIMSHAW TAYLOR, both of Albert Mill, Milltown Street, Radcliffe, Lancashire, Cotton Manufacturers, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to vacuum valves for use in steam heating apparatus, steam drying cylinders or drums, calendering rolls and the like and refers in particular to such valves of the kind which are normally closed by the pressure medium and are adapted to open under spring pressure or by gravity, the object of the invention being to provide an improved form of such valve.

According to the invention, the improved automatic mechanical valve consists of an ordinary (mushroom) valve, adapted to be fitted in the upper part of a steam pipe and to fall from its seating by gravity, or under the pressure of the outside air, when unsupported by steam in the pipe, and to close on to such seating under the pressure of the steam. The valve stem is hollow and bored laterally near the valve to allow of the quick ingress of air into the pipe. The stem is preferably formed rectangular, or triangular in cross-sections so as to leave room for the passage of the air into the pipe. To limit the fall of the valve, its stem is provided with a cross pin long enough to extend across the top edge of the valve casing which is formed so that the valve is mounted in a vertical part of the coupling casing, the valve proper being located in a pocket or recess out of line with the flow of steam or main body of the same.

The improved air valves will be further described with the aid of the accompanying drawings whereon:

Fig. 1 illustrates a vertical cross section of the improved automatic mechanical valve.

Fig. 2 illustrates a plan.

Referring to Figs. 1 and 2 *a* is the valve, the stem part *a*<sup>1</sup> of which extends upwards through the tubular casing *b* and at its upper end is supported by a cross pin *c* upon the top edge of the casing, the position of the cross-pin and the length of the valve stem being such as to cause the top face of the valve, when the valve is open, to lie a slight distance below the end of the casing *b*. The casing *b* screws into the upright branch of the tee coupling *d* fitted in the length of the steam pipes *e*, and the valve *a* lies in the pocket or recess *d*<sup>1</sup> out of line with the incoming steam so that the pressure of the steam acts solely in a direction to close the valve which is thereby rendered sensitive to very low pressures.

The valve stem is preferably hollow so as to reduce the weight of the valve whilst allowing of the valve being of a fairly large area. In the valve stem are holes *a*<sup>2</sup>. The valve stem *a*<sup>1</sup> is preferably square in cross section so as to leave ample space between each side of the stem and the casing.

There will be, at least, one of the improved air valves for each steam circulating pipe, arranged at the "return" end of the pipe and near the boiler. There will also be one of the improved air valves in the steam drum or boiler.

The improved valve operates as follows:—Steam being present in the steam pipes, it serves to raise the valve and hold it firmly against the lower end of the casing *b*, thereby preventing the escape of steam, whilst also preventing the ingress of air. As soon, however, as the steam fails, which in low pressure heating apparatus is liable to happen when the boiler fire is cooled down by fresh fuel, or when the fire burns very low, the valve *a* instantly drops, and thereby prevents the formation of a vacuum and effectually prevents the water in the boiler flowing into the steam pipe. Upon the steam again flowing through the pipes and its pressure rising, the valve *a* closes but not until the bulk of the air, previously admitted, has escaped, the steam usually rising slowly, driving the air before it, and then closing the valve.

Whilst chiefly for use with low pressure steam heating apparatus, the improved valve may be applied to other apparatus working under similar conditions. For example, the valve may be used with steam drying cylinders or drums, calendering rolls, and the like, requiring to be heated by steam and protected from collapse owing to a sudden drop of pressure.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. An automatic air valve for low pressure steam heating apparatus and the like of the kind in which a valve opens by gravity or under the pressure of the outside atmosphere immediately the steam fails, and thus prevents the formation of a vacuum in the steam apparatus, characterized in that the valve is of a size and weight which allow it to remain open until the normal steam pressure returns, said valve having a hollow stem which is bored laterally near the head and said head being mounted in a casing with the valve proper lying wholly within a pocket or recess, substantially as described.

2. In automatic air valves, the construction, arrangement and combination of parts substantially as herein described with reference to the accompanying drawings.

Dated this 2nd day of August, 1918.

For the Applicants,

JOHN G. WILSON & Co.,  
Chartered Patent Agents,  
55, Market Street, Manchester.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1919.

[This Drawing is a reproduction of the Original on a reduced scale.]

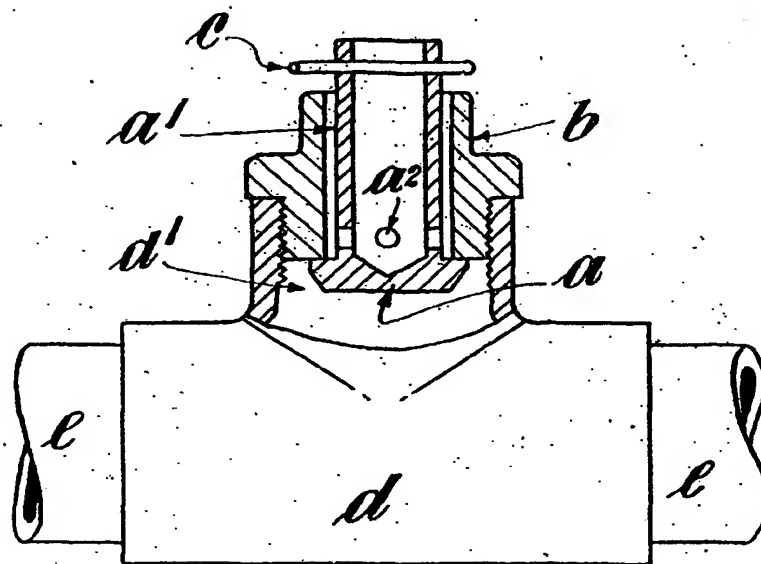


Fig. 1.

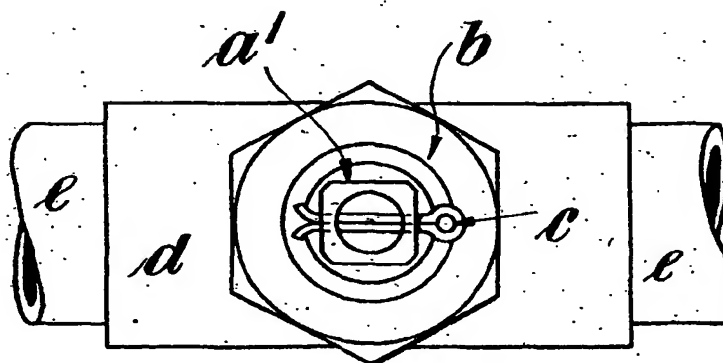
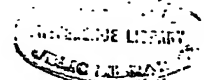


Fig. 2.



Malby & Sons, Photo-Litho.